

## ABSTRACT OF THE DISCLOSURE

A photosensitive sol-gel film containing an organometallic photosensitizer is deposited on the oxide containing surface layer of a silicon substrate. A pattern of white or ultra violet light incident to the photosensitive sol-gel film results in the unbinding of the photosensitizer from the exposed regions of the sol-gel film. A subsequent succession of first and second heating steps results in, first, the removal of the photosensitizer constituents from the exposed regions of the sol-gel film and, second, the removal of the organic constituents from the exposed regions, resulting in regions doped with a metal oxide with non linear optical properties (semiconductive, electro-optic, magneto-optic, etc.) properties. The location of electrodes on the interfaces of the exposed metal oxide waveguide regions with the unexposed regions results in an electric field modifying the index of refraction locally in response to an impressed voltage therebetween. Optical switches, couplers, waveguides, splitters, interferometers wavelength division multiplexer, Bragg gratings and more can be fabricated. A glass substrate also may be employed, instead of a silicon, in which case a separate silicon oxide surface layer is unnecessary. In the case where the exposed region includes magnetic material, a magneto-optic switch can be fabricated by the process.